LIBRARY
STATE PLANT BOARD

UNITED STATES

DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE NEWS LETTER

2 Peach Borer

VOLUME V

No. 8 Aug. 1, 1938

Digitized by the Internet Archive
in 2013

http://archive.org/details/newsletter38no8

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR JUNE 1938

Vol. V, No. 8 (Not for publication) August 1, 1938

R. A. VICKERY

The Bureau has received notice of the death of R. A. Vickery, associate entomologist in the Division of Pink Bollworm Control, at San Antonio, Tex., on July 13. Mr. Vickery was born in Minnesota on March 15, 1883. He received his A. B. degree from the University of Minnesota in 1906 and his M. A. degree the following year. His service in the Department of Agriculture began with his appointment as agent and expert in 1908. His field was economic entomology, specializing in the study of cereal and forage-plant insects. His published works include reports on studies of armyworm parasites, wingless May beetles, and Aphiidae. His outstanding work was "A species list of Aphiidae of the world and their recorded food plants," published in 1918 as joint author with H. F. Wilson.

Mr. Vickery was a member of Sigma Xi, the American Association for the Advancement of Science, the Entomological Society of America, the American Association of Economic Entomologists, and the Washington Entomological Society.

AMERICAN ASSOCIATION OF ECONOMIC ENTOMOLOGISTS CONSIDERS FORMATION OF TEACHING SECTION

The American Association of Economic Entomologists has appointed a special committee to consider the advisability of forming a section on teaching. The committee welcomes the support of any member of the Bureau of Entomology and Plant Quarantine who feels that this is a worthy undertaking. The Bureau is greatly interested in the teaching of entomology, especially as it offers the largest field for employment of young entomologists. Members of the Bureau who wish to express their views on this subject may communicate with Prof. Paul Knight, of the University of Maryland, College Park, Md., a member of the committee.

FRUIT INSECT INVESTIGATIONS

More on dichlorethyl ether for peach borer control.--In cooperation with the Illinois State Natural History Survey, experiments with dichlorethyl ether (30 cc per gal. of water), applied around each tree early in the spring for the control of the peach borer, were conducted in southern Illinois, and Oliver I. Snapp, in charge of this work, has submitted the following table, summarizing the results obtained on April 11-13 from this material applied on March 16, 17, and 19.

Dosage of dichlorethyl ether	Age of trees	Results		
		Total borers	Borers dead	Tree injury
	Years	Number	Percent	
1 pint	10	29	93.1	None
3/4 pint	10	16	87.5	Do.
1 pint	10	31	100.0	Do.
3/4 pint	10	30	100.0	Do.
3/4 pint	4	97	91.8	Do.
1/2 pint	4	112	82.1	Do.
1/2 pint	2	26	80.8	Do.
1/4 pint	2	15	66.7	Do.
1/2 pint	2	9	88.9	Do.
1/4 pint	2	9	88.9	Do.

The soil around the trees received no preparation whatever before the dichlorethyl ether was applied, and the application of that material was made by pouring the dose from a half-pint tin cup around the base of the tree, which wetted the soil immediately surrounding the tree, and the lower part of the trunk received some of the liquid during treatment. The treated surface was covered with a little soil. Although not quite so effective as ethylene dichloride emulsion, dichlorethyl ether, a water-soluble material, gave very good control of the peach borer in most of these early spring experiments at a time when paradichlorobenzene crystals gave practically no control, because the soil temperatures were too low for that material to be effective. The results confirm those of previous experiments in that this material is more effective against the peach borer and safer for use around peach trees during cool or cold weather.

Oviposition by grape berry moth in the laboratory.--Investigators have for years experienced difficulty in inducing *Polychrosis viteana* (Clem.) to lay eggs under laboratory conditions. George A. Runner and George W. Still, of the Sandusky, Ohio, laboratory, have given special attention to this problem in the last 2 or 3 years. By giving the insect special conditions of light intensity and reflection in a cage recently constructed, eggs have been obtained in fair numbers. These will be used in laboratory tests of insecticides, both against the egg stage and against newly hatched larvae.

Grape berry moth reared on cherry in the laboratory.--In the course of experiments to develop cages in which grape berry moths would lay eggs, Messrs. Runner and Still found in 1937 that under certain conditions of light and temperature the moths would deposit eggs on sweet cherry and these were develop to the adult stage of the insect. This as far as known is the first record of complete development in any fruit other than grape. During the present season numerous eggs were obtained on sweet cherry and moths were again reared from this fruit. Various other fruits were used under like conditions but no eggs were obtained.

Flight period of the Indian-meal moth.--A record of the activity of *Plodia interpunctella* (Hbn.) throughout the night of May 13-14 was obtained by Dwight F. Barnes and George H. Kaloostian of the Fresno, Calif., laboratory. Collections were made by means of a rotary net driven by an electric motor at a speed of about 21 miles per hour at an elevation of about 3 feet. The net was located in a raisin storage yard in Fresno. Catches were removed at intervals of 15 minutes from 5 p.m. to 7 a.m. Ten species of insects found in dried fruit, totaling 3,410 individuals, were separated from the catches. The habit of nocturnal flight of the Indian-meal moth was demonstrated. The first moth was taken during the period which ended at 6:45 p.m. (sunset was at 6:58), when the light intensity was 100 foot candles. Five were taken at 7:45, when the light reading was 0.25 foot candle. The photoelectric exposure meter used for measuring light intensity registered zero at 8 p.m., at which time the net contained 7 Indian-meal moths; between 8 and 9 p.m., 54 moths were captured; from 9 to 10 p.m., 33; from 10 to 11 p.m., 22; from 11 to 12 p.m., 15; from 12 to 1 a.m., 5; from 1 to 2 a.m., 1; and from 2 to 3 a.m., 4. The last moths, two in number, were taken at 3:15 a.m., about 1-1/2 hours before sunrise.

Adult Japanese beetle activity during June.--The Japanese beetle laboratory at Moorestown, N. J., reports that owing to the general prevalence of cloudy, relatively cool weather which characterized the greater parts of May and June, emergence of adult Japanese beetles appeared to be somewhat later than usual. The first adult was collected in the vicinity of Moorestown on June 18, while the corresponding date in 1937 was June 14. Beetles thereafter increased slowly in numbers and did not become locally abundant, even in heavily infested areas, until near the close of the month. During the last 10 days of the month, adult beetles for the most part were relatively inactive as a result of unfavorable meteorological conditions. Obvious injury to vegetation was evident locally in parts of New Castle and Kent Counties, Del. The first beetles of the season in New England are reported as having been found in Bridgeport, Conn., on June 20 and at Springfield, Mass., on June 23.

MEXICAN FRUIT FLY CONTROL

Few Mexican fruit flies trapped.--Only four adult *Anastrepha ludens* Loew were trapped in the lower part of the Rio Grande Valley in June. Three of these came from one property which was known to have been heavily infested earlier in the season. No larval infestations were discovered within the area. Intensive trapping and pupation-tray studies throughout the month failed to reveal the presence of any *A. ludens* adults or larvae in the Falfurrias district. The following table summarizes the collections during the month.

Species	Texas	Mexico
Adults*		
A. ludens	70	32
A. serpentina Wied	5	0
A. sp. "L"	2	0
A. pallens Coq	210	96
Toxotrypana curvicauda Gerst	1	0
Total	288	128
Larvae		
A. ludens	0	1,012
A. mombinpraeoptins Sein	0	25
Total	0	1,037
Grand total	288	1,165

*Of these, 66 were from without the regulated area.

CEREAL AND FORAGE INSECT INVESTIGATIONS

European corn borer parasites in Lake States area.--W. G. Bradley, Toledo, Ohio, reports that field collections of corn borer larvae were made in the vicinity of release points in northwestern Ohio and southeastern Michigan in the fall of 1937. Emergence of parasites, in a developmental environment following winter storage in the laboratory under hibernation conditions, provided the following information relative to their status in the area studied. In Jerusalem Township, Lucas County, Ohio, the parasitization by Lydella stabulans var. grisescens R. D. has increased continuously since its first release at that point in 1927. Within a 3½ mile radius of the colony site parasitization averaged 23 percent, and averaged 10 percent within a radius of 7½ miles. Adequate collections from five fields showed an average of 53-percent parasitization by this species. Dispersion of Lydella follows closely the limits of marshland contiguous to Lake Erie. Inareolata punctoria Roman, the only other exotic parasite recovered, was obtained for the fifth consecutive year at a point 1 mile east of the colony site in Erie Township, Monroe County, Mich. The native parasites Panzeria penitalis Coq., Zenillia caesar Ald., Labrorychus prismaticus Nort., and Bassus agilis Cress. accounted for less than 1 percent of the parasitization in all the collections.

Effect of flooding on viability of grasshopper eggs.--C. C. Wilson, Sacramento, Calif., reports that during January, February, and March many alfalfa fields in the Sacramento Valley were under water and that the soil was supersaturated during April and the early part of May. Ten egg pods each of Melanoplus differentialis (Thos.) and M. femur-rubrum (Deg.) were recovered from the supersaturated soil and placed in laboratory cages on May 25. The chorion of the eggs was black and in some cases nearly bursting; however, in less than 10 days 100 percent of the eggs of M. differentialis and 82 percent of the eggs of M. femur-rubrum had hatched, indicating that the excessive moisture had little or no effect on their viability.

Classified American wheats show high susceptibility to hessian fly.--W. B. Cartwright, Lafayette, Ind., states that approximately 200 common wheat varieties were tested in the greenhouse at Lafayette in May and June 1938, coincidental with the period of emergence of a normal supplementary brood of flies in the field. One hundred eighteen varieties with winter habit of growth showed high plant infestations with only Imperial Amber, Mediterranean, Kruse, and Penquite falling slightly below the range of high susceptibility. Of 81 varieties with spring habit of growth, Illinois No. 1, W38 (Java type) had a low plant infestation of 15 percent. Dixon, Java, Marvel, and Marquillo ranged within 60-80 percent plant infestations, in contrast to 100 percent for the more susceptible varieties.

Survival of hibernating corn earworm pupae to exposure of winter air temperatures.--According to F. F. Dicke, Arlington, Va., it has been apparent for a number of years that a combination of temperature and soil moisture was an important limiting factor in the rate of successful hibernation of the corn ear worm. For the last two winters, hibernating pupae in salve boxes on dry and on moist sand have been exposed to outdoor temperatures at Arlington, in order to obtain some idea of what minimum temperatures they might be able to withstand. In the following table are briefly summarized the results of the experiment carried through the winter of 1937-38. All were started on November 13.

Source of moths	Salve-box environment	Host	Pupae	Pupae surviving on April 2		Moths emerged
			Number	Number	Percent	Number
Arlington, Va	Dry	Field corn	52	28	53.8	27
	Moist	do.	52	2	3.8	1
Moorestown, N. J	Dry	Sweet corn	32	15	46.9	13
	Moist	do.	32	0	--	--
Marietta, Ohio	Dry	do.	64	34	53.1	28
	Moist	do.	68	0	--	--

The mean temperature for December was slightly below normal, for January slightly above normal, and for February and March considerably above normal. Moths emerged from approximately 87 percent of the pupae surviving on April 2. For a total of 67 days the minimum temperature was freezing, or below. The minimum temperature for the winter was 14° F., which was recorded twice. On 13 days the minimum temperature was below 20°. The lowest soil temperature recorded at a depth of 3 inches, about the average hibernation level, was 32.5°. The data indicate that hibernating pupae can withstand rather severe winter temperatures, especially under low soil moisture conditions. The difference in the survival on dry and on moist sand is attributed primarily to the difference in the rate of thermal conductivity under these two conditions. On moist sand the exoskeleton of the pupa is moist, and in contact with a moist medium heat is permitted to flow readily from the insect body. When pupae become fused by ice (which has a higher thermal conductivity than water) to the medium on which they are resting, the body heat is given up rapidly. In a dry environment the exoskeleton is dry and there is little direct flow of heat from the insect body because it is largely surrounded by air, which is an excellent insulator.

Amazon fly parasite of sugarcane borer received and bred in Louisiana.—Thirty-nine mated female Amazon flies (*Metagonistylum minense* Towns.) were received at the Houma, La., laboratory on May 4 from K. A. Bartlett, Puerto Rico. T. E. Holloway, Ralph Mathes, and others dissected these flies and inoculated 1,646 larvae of *Diatraea saccharalis* (F.) with at least 3 maggots each. As a result, 1,951 adult flies were reared from these inoculated borers. Field releases of the fly have been made and breeding work is being continued.

Chelonus annulipes Wesm. released for sugarcane borer control in South.—J. W. Ingram, Houma, reports the receipt of a shipment of 6,000 adults of *C. annulipes* on June 8 from W. A. Baker, of the Toledo, Ohio, laboratory. Only 14 of these were dead. Releases were made in two locations on each of three sugarcane plantations in Louisiana. Arrangements were made for R. N. Lobdell, entomologist of the Everglades, Fla., State Experiment Station, to receive the same number of parasites from Mr. Baker. These were received at West Palm Beach on June 9 and released at two locations near Lake Okeechobee and at two sites on Fellsmere Plantation, near the town of Fellsmere.

Plant and stubble sugarcane as sources of spring borer infestation.—E. K. Bynum, Houma, reports that eight times as many eggs of *Diatraea saccharalis* (F.), many times as many borer stages, and 14 times as many "dead hearts" caused by borer larvae were found in first-year stubble sugarcane fields, of the variety Co. 281, as were found in adjacent plant cane of the same variety. These results confirm those of previous years, that stubble cane is a more important source of spring borer infestation than is plant cane.

Corn ear worm infestation in the Central States may originate from commercial shipments.--R. A. Blanchard, A. F. Satterthwait and J. M. Wagner, Urbana, Ill., state that circumstantial evidence indicates that early shipments of sweet corn from the Gulf States may be a source of infestation by the ear worm in the Central States. During 1937-38, this problem has been studied in Illinois and Missouri. Green corn is shipped to the wholesale center at St. Louis, beginning early in May. This corn has been observed to be heavily infested by the larvae of *Heliothis obsoleta* (F.). After reaching the wholesale centers, it is distributed over a wide marketing area throughout the surrounding States. Some of this infested corn is displayed for sale in open-air markets for a considerable length of time. No records of larvae leaving the corn and entering the soil to pupate have been obtained as yet, but that could easily be the case. The early field infestation records for 1938 further tend to point to the early shipments of corn and tomatoes from the South as a source of ear worm infestation. Very little natural infestation occurred north of the southern tip of Illinois up to June 8. In an early market corn area near East St. Louis, however, infestations up to 26 percent were observed by June 9. This area is near sidings where large numbers of refrigerator cars carrying infested corn and tomatoes from the South are switched and cleaned. Large numbers of full-grown H. obsoleta larvae have been found in these cars and in one instance four living pupae were found in a car that had made the trip from the South to East St. Louis, thence east to Pittsburgh, Pa., and back to a siding in central Illinois. It was determined in 1938 that areas 25 miles or so from the car-concentration points had only a light early infestation.

Spring wheats resistant to infestation by hessian fly.--E. T. Jones, Manhattan, Kans., reported on July 9 that tests of spring wheat under actual field conditions of infestation to hessian fly at Springfield, Mo., show that a number of varieties are resistant to spring infestation. Of a series of 100 selected spring wheats, F.P.I. 94549, IV CI + #, IVy (Gelou), Renacimiento, Triumpho, F.P.I. 94585, Illinois, No. 1W 19, F.P.I. 94570, F.P.I. 94600, Unnamed common CI 10143, F.P.I. 94571, and Unnamed common CI 10153, were found to be resistant to fly. Artigas and Pusa #4 also appeared to be resistant in these tests. Varieties are listed in order of resistance.

Wild grasses may become hessian fly reservoirs.--Recently completed infestation tests of grasses likely to become hosts of the hessian fly show that appreciable populations may be built up on several wild grasses. Of the 16 species of Agropyron, 14 species of Elymus, and 2 species of Hystrix tested, all selections of these species were found to support infestations of hessian fly. Of a number of selections involving six species of Lolium, only one selection of L. remotum became infested.

JAPANESE BEETLE CONTROL

Prefumigation of refrigerator cars.--Fumigation of empty refrigerator cars prior to their loading with bananas began in Baltimore on June 17. As was the case last year, the United Fruit Company continued to use liquid hydrocyanic acid with a dosage of 3 ounces in each of two pans set in the doorway of the car. Standard Fruit Company repeated their use of HCN discoids. In addition to the fumigation of empty cars by the Standard and United Companies, both the Pennsylvania and the Baltimore & Ohio Railroads fumigated empty cars for the Lanassa Fruit Company. Similar prefumigation of cars prior to loading with certified farm products was started in New Jersey on June 25 and 20 empty cars were fumigated between June 25 and 30. In addition, four cars of onions were fumigated with HCN by the Central Railroad of New Jersey at Bridgeton Junction, N. J. This railroad will use HCN for the fumigation of all farm products that require this treatment before moving out of the heavily infested area in New Jersey. The same fumigant will be used by the Pennsylvania-Reading Seashore Lines in the fumigations made at Camden, N. J. All arrangements had been made at the end of the month to start fumigations in Philadelphia and New York City on July 1.

Fumigation with methyl bromide.--Following a demonstration of a new method of methyl bromide fumigation by a representative of a Michigan chemical manufacturer, fumigation of white potatoes with this chemical was begun on June 16 at the Pennsylvania Railroad freight yards at Edge Moore, near Wilmington, Del., and the Greenwich yards in Philadelphia. The procedure followed requires plugging of the drips, closing of the doors, setting of plugs in the bunker doors, and lowering of the electrically driven blower assembly in one bunker hatch. Eight minutes is required to introduce the 5 pounds of methyl bromide in spray form through one bunker at the same end as the blower. The blower is operated while the fumigant is being introduced and for an additional 20 minutes. The 2-hour fumigation period begins after the introduction of the gas. At the end of the fumigation period, the bunkers are opened and cloth screens on light wooden frames are wired in each of the four bunkers. One door is also opened and immediately covered with a screen, which remains in place while the car is being ventilated. During the latter half of the month, 736 carloads of white potatoes were fumigated in this manner.

Heavy beetle infestation in Washington, D. C.--Infestations in the District of Columbia and nearby Virginia are quite heavy this year. These most affected are residents in the northeastern and southeastern sections of the District and in Alexandria, Va. During heavy emergence of the beetle on June 21, the Washington suboffice, in a 5-hour period, received 35 telephone calls from individuals reporting beetles on their property and requesting control measures. Visits were made to 6 infested gardens, where from 100 to 1,000 beetles were observed. Beetles were found on clothes hanging on wash lines, on sides of houses, in homes, and, naturally, on practically all flowers and shrubs in the yards.

Beetle information service in Baltimore.--Because of the large number of telephone inquiries concerning Japanese beetle control received annually from Baltimore residents, the City Park Department, during the latter half of June, established a beetle information service at Druid Hill Park. Despite the availability of this service, telephone inquiries continued to pour into the Baltimore district office.

Trap-scouting for Japanese beetle.--Trapping in nonregulated areas progressed according to schedule during the month. Trapping had been concluded and the traps lifted in Mobile, Ala.; Valdosta, Ga.; Tallulah, La.; Leland, Miss.; Las Cruces, N. Mex.; and Bryan, Del Rio, El Paso, Lamesa, and Laredo, Tex. Traps were still in operation in the following numbers of cities and towns in their respective States: Alabama, 1; Arizona, 7; California, 11; Florida, 9; Georgia, 17; Illinois, 3; Indiana, 3; Iowa, 1; Kentucky, 5; Louisiana, 4; Mississippi, 3; Missouri, 2; New Mexico, 3; North Carolina, 23; Ohio, 16; South Carolina, 13; Tennessee, 2; Texas, 32; Virginia, 53; and West Virginia, 5.

Japanese beetle control personnel increases.--By the end of the month many of the summer personnel had been hired and assigned to their stations. One hundred and sixty-two inspectors of farm products were assigned to 42 inspection centers scattered throughout the regulated area. Scouting of classified nurseries and greenhouses was assigned to 45 men. Forty-seven men were engaged in soil-treating work at Erie, Pa., and at Chicago, Ill. The total trapping personnel distributed among 12 States numbers 283. The grand total of men employed on the project, both appointed and temporary, as of June 30, was 734.

Blueberry fumigation.--Officially the fumigation of blueberries with carbon disulphide at the New Lisbon, N. J., fumigation house started June 20. Prior to this date, however, the Blueberry Cooperative Association had fumigated some berries on their own accord to control a maggot infesting their product. Of 2,531 crates fumigated by the Association during June, 2,344 crates were certified for movement to markets outside the regulated area.

Early beetle emergence.--Appearance of the adult Japanese beetle during June preliminary to heavy emergence was observed in Richmond, Va., on the 8th; Governor's Island, New York Harbor, on the 17th; Hartford, Conn., on the 19th; Bridgeport, Conn., on the 21st; Bloomfield, N. J., on the 22nd; and Springfield, Mass., on the 23rd.

Gypsy moth egg clusters reappear in inspected material.--Among quarantined products submitted for inspection in June were two carloads of lumber, on each of which single egg clusters were found. One was inspected at Deering Junction, Maine, for shipment to Gibbstown, N. Y., and the other was destined from Cornish, Maine, to Outremont, Quebec. Enough larvae to start a sizable infestation were destroyed in a carlot shipment of railroad ties from Smithfield, R. I., to Montowese, Conn. Six larvae were also destroyed in a carload of lumber en route from Deering Junction, Maine, to Camden, N. J., and a single larva was detected in a similar shipment inspected at the same point for movement to Suspension Bridge, N. Y.

Scouting of railroads by autogiro.--The largest autogiro of the fleet left the home airport on June 10 with a pilot and two observers for Laurel, Miss., arriving at destination on the following evening. The gasoline tank truck and operator were contacted at this point. On June 13 the unit started the first flight in the railroad-scouting program, proceeding to Louisville, Ky. A total of 3,615 miles was flown by the autogiro crew in the first 3 weeks of flight. The itinerary of the 18 States to be covered by the aerial crew and the follow-up ground crews involves a complete survey of 14 railroads over which imported elm logs were shipped, as follows: Atlanta & West Point, Baltimore & Ohio, Illinois Central, Louisville & Nashville, Missouri Pacific, Norfolk & Western, Pennsylvania, Southern, Big Four, Delaware, Lackawanna & Western, Erie, New York Central, Nickel Plate, and Western Maryland.

Training Dutch elm disease scouts.--Scout schools were started on June 6, all W. P. A. personnel having been laid off from June 1 to 5 in anticipation of the opening of the scouting season. Schools in Connecticut were located at Stamford, Danbury, Trumbull, and Guilford. Approximately 275 men, 62 of them from the Pine Shoot Moth project, were trained at these 4 schools. In New York, 610 W.P.A. workers reported for training. In New Jersey, scout schools were started in each infected county on June 7. A school at Easton, Pa., was started on June 9, with a total of 15 men. In isolated infected sections, scout schools were organized at Indianapolis and Evansville, Ind.; Cleveland, Cincinnati, and Athens, Ohio; Martinsburg and Parkersburg, W. Va., and Baltimore and Cumberland, Md. Systematic scouting started in most localitites on June 13.

Extensions of infected zone.--Confirmation of an elm in Hope Township, Warren County, and another in Asbury Park, Monmouth County, N. J., enlarged the infected zone by several square miles. An additional confirmation in Holland Township, Hunterdon County, N. J., further added 22.75 square miles to the New Jersey area. On June 21, two confirmations were received covering elms located in Beacon and Poughkeepsie, Dutchess County, N. Y., thereby adding a new county to the infected zone. Later in the month a third confirmation in Dutchess County added the township of Hyde Park to the infected zone. The third tree was found by a Federal crew from the Poughkeepsie training school while checking a group of devitalized elms for field practice.

Reduction in force on Dutch elm disease work.--Several reductions in W.P.A. personnel were made during June, particularly in New Jersey. The total force to be carried over into the next fiscal year on the entire project numbers 30 percent fewer than was available for the work last year. Approximately 3,697 workers of different classifications have been retained.

Autogiro scouting in the main work area.--On June 20, autogiro scouting was started in Morris and Passaic Counties, N. J. In Putnam County, N. Y., scouting started June 21. The aerial crew operating in Northampton County, Pa., began their flights on June 21 also.

Dutch elm disease accomplishments.--During the 4-week period ending July 2, 1,410 elms were confirmed as infected with the Dutch elm disease. Scout crews collected a total of 15,013 samples from trees showing wilting or yellowing foliage or streaking in the wood. In the same period, eradication crews destroyed 376 diseased trees, and other crews removed 9,407 dead and devitalized elms.

Mass autogiro flight.--A tune-up flight of the Division's five autogiros was held on June 7, preparatory to dispersal of the ships on their individual scouting assignments to search for elm trees infected with the Dutch elm disease. In formation the giros flew over Bloomfield, Montclair, East Orange, Newark, and Paterson.

FOREST INSECTS

Cooperative study of Armillaria mellea.--J. C. Evenden, of the Coeur d'Alene, Idaho, laboratory, reports the institution of a cooperative study by the Forest Experiment Station at Missoula, Mont., the School of Forestry at the University of Idaho, and the Forest Insect Laboratory concerning the importance and interrelations of the shoe-string root-rot fungus, Armillaria mellea, in white pine to attacks of the mountain pine beetle. This study is being conducted on the Coeur d'Alene National Forest where a field laboratory has been established to determine the various root fungi encountered.

Biological studies on the Black Hills beetle.--J. A. Beal and Donald De Leon, Fort Collins, Colo., report that an analysis of the data obtained on the biological study of the Black Hills beetle during the summer of 1937 largely confirms the findings on this study during the two previous years.

It is interesting to note that second-year emergence (beetles requiring 2 years to develop at high elevations) was found to be about the same as last year, or 9 percent. A small amount of third-year emergence was recorded for the first time in 1937. The number of adult beetles emerging from the three hosts studied varied greatly. Emergence from limber pine averaged 88.1 beetles per square foot; from lodgepole, only 19.7 per square foot; and from ponderosa pine, 28 per square foot. A 3-year comparison of Black Hills beetle emergence from lodgepole pine and limber pine is shown in the following table:

Year of emergence	Lodgepole pine		Limber pine	
	Emergence per sq. ft.	Sq. ft. of bark	Emergence per sq. ft.	Sq. ft. of bark
1935	18.2	32	164.5	28
1936	51.9	40	89.1	32
1937	19.7	40	88.1	60

The period of emergence from ponderosa pine at Wah Keeney Park, Colo., practically coincided with the emergence of the beetle from limber pine at Elk Mountain, Wyo., although the latter place is 2,500 feet higher and about 150 miles farther north than Wah Keeney Park. Elevation does not seem to affect the amount of brood. Also, the side of tree appeared to have little effect on beetle emergence. In 1937 over 140 different associated species of parasites, predators, and associated arthropods were found to be present in infested trees. Although a similar number were collected from both the Wah Keeney Park ponderosa pine and the Elk Mountain lodgepole and limber pine, the species and relative numbers were not similar in these two areas.

Another bark beetle found capable of transmitting Dutch Elm disease.--W. D. Buchanan, of the Morristown, N. J., laboratory, has carried on an experiment with Scolytus sulcatus Lec. as a vector of the Dutch elm disease fungus. This bark beetle has been found most frequently attacking apple trees but infests also elm. It is sometimes found in elms affected with the Dutch elm disease. Mr. Buchanan artificially contaminated adults of S. sulcatus with the fungus and then placed them in cages with small healthy elm trees. The adults vigorously attacked the twig crotches and the trunks and the trees later showed wilting and discoloration in the wood. The fungus was later cultured from sections of the trees. The experiment indicates the possibility of the beetle causing healthy trees to become infected provided it has come in contact with the fungus before attacking such trees.

Attempt made to trap elm bark beetles in upper air.--A. E. Lantz, of the Morristown, N. J., laboratory, was able to make three flights in a semi-rigid airship during June in an attempt to trap elm bark beetles in the air. This was made possible through the kind cooperation of the United States Naval Air Station at Lakehurst, N. J. Mr. Lantz constructed screens and a frame to hold them in place on the side of the airship. The screens were treated with a sticky material and could be placed in and removed from the frame at will. The flights were made over parts of New Jersey, New York, and Connecticut. The total mileage flown was approximately 686, and 90,552,000 cubic feet of air were sampled at altitudes between 600 and 3,400 feet. No elm bark beetles were taken on the screens.

Elm trap logs furnish information on elm bark beetles.--The Bureau's eradication unit and the Morristown, N. J., laboratory, have cooperated in placing elm trap trees in six outlying areas where elms affected by the Dutch elm disease have previously been found and destroyed. The object of this work was to secure additional information on the elm bark beetles occurring in these areas, and also to find out what percentage of them were carrying the Dutch elm disease fungus. To obtain this latter information, beetles and galleries made in the trap trees were removed and cultured. The six areas were as follows: Old Lyme and Guilford, Conn.; Brunswick, Md.; Cumberland, Md.-Wileys Ford, W. Va.; Athens, Ohio; and Indianapolis, Ind. The trees were placed during May and examined and later destroyed in June. The native elm bark beetle, *Hylurgopinus rufipes* Eich., made galleries in the trap trees in all six areas. The smaller European elm bark beetle, *Scolytus multistriatus* Marsh., made galleries in trees put out in the Athens, Ohio; Brunswick, Md.; and Cumberland, Md.-Wileys Ford, W. Va., areas. This is the first time that this introduced bark beetle has been taken in the Brunswick, Md., and Cumberland, Md.-Wileys Ford, W. Va., areas.

Recent work on European spruce sawfly.--P. B. Dowden, P. A. Berry, and F. E. Miller, Jr. (Collaborator), of the New Haven, Conn., laboratory, have been engaged in investigations on the European spruce sawfly and its parasites. Mr. Dowden is conducting the sawfly survey, Mr. Miller the mass reproduction work with *Microplectron fuscipennis* Zett., and Mr. Berry reproduction work with other species of parasites. Surveys have been completed in 5 towns in Vermont and 5 towns in southern New Hampshire, and about 10 infested areas suitable for *Microplectron* liberation have been discovered. All of these are in towns adjacent to Wilmington, Vt., and Dublin, N. H., where severe infestations were found in 1937. Sawfly feeding is already heavy at these points. Development is very irregular; some overwintering cocoons are just producing adults, all stages of larvae are present, and a great many are full grown or nearly full grown. On June 28, one newly formed first-generation cocoon was found. To date approximately 3 million *Microplectron fuscipennis* larvae have been produced and are being held at temperatures to retard further development. Reproduction work with three other parasites of European origin which will attack this sawfly is under way. These parasites are *Microcryptus* sp., *Exenterus abruptorius* Thunb., and *Exenterus adspersus* Htg. Breeding stock was obtained from the Dominion Parasite Laboratory, Belleville, Ontario.

Sprays tested against white pine weevil.--S. F. Potts, New Haven, Conn., reports that practically a complete kill of the white pine weevil was obtained in 2 plots of approximately 1,200 trees each by spraying with a concentrated mixture containing 1 part lead arsenate to 10 parts of water and with 1 part lead arsenate to 20 parts of water. The mixture contained fish oil as an adhesive and "Aresket" as a wetting agent. In several small plots treated with mixtures containing lead arsenate, derris, derris resinate, cryolite, and free nicotine in oil, derris gave the most promising results. The cost of application did not exceed $3 per acre.

Additional injections of enzyme from Matsucoccus scale made in pine twigs.--T. J. Parr, of the New Haven, Conn., laboratory, reports that all enzyme injections made on May 21 and May 24, as discussed last month, showed definite injury to the pitch pine twigs on June 1. On June 4, five enzyme injections were made in tree No. 2. This extract was made from the salivary glands of two insects which had just completed the second molt. Six checks were made on the same tree, three being dry bulbs and three with 30 percent glycerine. On June 8 the enzyme injections were beginning to show slight injury, the checks none. On June 14 the twig injected June 4 was showing more injury and there was a definite swelling of the twig at point of injection. Toward the end of June slight injury was apparent on some of the check injections in the greenhouse at New Haven. On June 14 extraction of salivary glands from 12 late first-stage crawlers was made in 10 cu mm of 30 percent glycerine and transported to Prescott, Ariz., where this material was injected in both current and 1937 growth on young ponderosa pine trees. In the next several days extractions from the salivary glands of the late first stage of a different species of Matsucoccus, which occurs around Prescott, were made and injections carried out on several young ponderosa pine trees. Injections and checks totaling 179 were made on both current and 1937 growth. On June 23 these injections appeared to be showing injury. There was some slight injury also on check injections, especially where there had been much prodding to get the bulb to stay in the extremely soft new growth. It was still too early to tell whether there would be any injury on the 1937 growth.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Progress of gypsy moth spraying.--Federal gypsy moth work in Massachusetts, Connecticut, and Pennsylvania during the month of June consisted almost entirely of spraying tree foliage at selected locations with lead arsenate in order to kill the feeding caterpillars. On June 1, 12 spraying machines were in operation in Massachusetts, 18 in Connecticut, and 26 in Pennsylvania. In addition, 18 sprayers, most of which were loaned by the Federal Government, were in operation in New York State under the supervision of the State Conservation Department. The majority of the sprayers were operated on the single-shift basis because of the lack of available men, but the double-shift method was employed wherever possible. During the first two weeks in June approximately 60 tons of lead arsenate and 47 barrels of fish oil were delivered to spraying centers in Massachusetts and Connecticut alone.

Varied types of gypsy moth work undertaken in June.--By June first all regular and emergency employees assigned to gypsy moth work in Massachusetts, Connecticut, and Pennsylvania were engaged in spraying the trees with lead arsenate during favorable weather. As no spraying work was planned in Vermont this season, the workers in that State continued their scouting work in the mountainous regions along the eastern edge of the barrier zone. The bulk of the spraying in New York State was done by C. C. C. enrollees, which released a large percentage of the W. P. A. workers for scouting, burlapping, patrolling burlap bands, and other duties. As no infestation was found in New Jersey during the past year, the small force of workers in that State continued to scout the areas most likely to contain infestations.

Frost damage to foliage alters spraying plans in some sections.--Severe frosts in May damaged the foliage in certain woodland areas where gypsy moth spraying was planned to such an extent that the work could not be performed until the foliage from the secondary buds had had an opportunity to develop. This condition was especially noticeable in Pennsylvania.

Pulpwood cutting retards gypsy moth scouting work.--Gypsy moth scouting crews working in Bennington County, Vt., have been retarded materially because of the methods used in cutting a large amount of pulpwood in that region during the spring. Throughout large forested areas softwood trees have been cut, and the upper portions have been left where they fell. The tangled tops not only impede the progress of the scouts but also are most difficult to examine for gypsy moth infestation. This condition is particularly true in the town of Sunderland.

Islands in Lake Champlain not infested by the gypsy moth.--The islands in Lake Champlain could not be examined for the gypsy moth at the time that scouting work was done on the mainland in Addison County, Vt., because of the unsafe condition of the ice during the past winter. They were recently scouted by the regular supervisory personnel assigned to duty in Vermont and were found to be uninfested.

Long hose lines used where convenient water supply is lacking.--Several gypsy moth infestations in New Marlboro, Mass., are located at considerable distances from a suitable water supply, and it was necessary to pump the water through long hose lines in order to spray the areas. At one of the infestations, which is situated on a high elevation and is a dangerous source from which caterpillars could be distributed in all directions by the wind, approximately 5,000 feet of hose was used in the water line supplying the sprayer and about 4,300 feet was used in carrying the solution from the sprayer to the area treated.

Porcupines damage hose lines.--Porcupines in the vicinity of West Stockbridge have developed an appetite for rubber. They have damaged several lengths of hose used in spraying for the gypsy moth, and tooth marks were plainly visible on several other lengths. One section of hose was gnawed in six different places. Similar trouble was experienced in a few localities in 1936.

Early completion of spraying on Long Island releases sprayers for work at other locations.--Tree foliage developed earlier on Long Island, N. Y., than in other sections of the State, and spraying for the gypsy moth was started during the first half of May. All of the work planned for that region by the New York Conservation Department was completed on May 31, and the equipment was moved to Putnam Valley and to other locations in the barrier zone where the foliage was slower in developing.

Intensive treatment precedes spraying at two gypsy moth infestations.--Spraying work was completed during the first half of June at the isolated infestations in the towns of Damascus and Paradise, Pa., and the sprayers were transferred to Spring Brook and Bear Creek. The spraying of these two infestations was preceded by intensive scouting, thinning, and treatment work, and total extermination of the gypsy moth is expected by the end of this year.

Nearly 4,000,000 gypsy moth egg clusters creosoted by C. C. C.--During the past fiscal year C. C. C. enrollees creosoted slightly more than 3,800,000 gypsy moth egg clusters. Of these, more than 28,000 were treated in Connecticut; approximately 400,000 in Vermont; and the remainder, about 3,372,000, in Massachusetts. The creosoting work was completed during the latter part of May, and by the end of the first week in June the men had placed burlap bands around more than 470,000 trees and had crushed approximately 60,000 caterpillars.

Gypsy moth defoliation reported by C. C. C.--Reports of severe gypsy moth defoliation have been received from scattered locations in the infested area. Trees at a very heavy infestation in Russell, Mass., where C. C. C. enrollees performed a large amount of gypsy moth work during the past winter, were approximately 40-percent defoliated by the middle of June. The damage is confined principally to a few small pockets of poplar growth which it is planned to remove during the coming winter. Indications are that large woodland areas in Russell would have suffered severe defoliation this summer if the control work had not been done, as considerably more than 1,000,000 gypsy moth egg clusters were creosoted in the town during the past fiscal year. Severe defoliation was also reported near the base of Mount Toby in Sunderland, and in Deerfield and Holyoke, Mass.; in oaks and gray birch in Granby, Conn.; and in large oak trees in Westminster, Vt.

Infestations in Connecticut sprayed by C. C. C.--Enrollees from the C. C. C. camp in Cornwall, Conn., were temporarily detailed to assist in spraying gypsy moth infestations discovered during the year in the adjoining town of Sharon, which is located in the Connecticut section of the barrier zone. The use of the C. C. C. men for this work resulted in the treatment of a greater acreage in Connecticut than would otherwise have been possible.

PLANT DISEASE CONTROL

Factors affecting the development and spread of stem rust in 1938.--E. C. Stakman, in charge of rust surveys, reports as follows concerning the development of stem rust this year: "In studying the factors affecting the development of stem rust in 1938, it is apparent that a small amount of initial inoculum early in the spring can increase so rapidly under favorable conditions as to assume epidemic proportions by harvest time. The experience this year emphasizes the fact that, regardless of its source, a small amount of inoculum is dangerous. Thus the earliness of barberry infection assumes considerable importance. In addition, because of the fact that small amounts of inoculum can multiply so rapidly in the very susceptible

LIBRARY
PLANT BOARD

soft winter wheats in the South, the breeding of rust-resistant varieties for the winter wheat area is extremely important. It has been shown that the soft red wheats in general are far more susceptible than the hard red wheats. This conclusion is reached not only as a result of field observations but also as a result of controlled experiments. The aggregate damage from stem rust in the winter wheat region will not be comparable with that of 1937, as the development of epidemics was more local than last year. However, the heavy succulent stands in most places, together with superabundant May rainfall, furnished ideal conditions for rapid increase of stem rust. The terrific and widespread leaf rust epidemic, together with stem rust and unfavorable weather conditions, caused heavy damage to winter wheat in certain areas, notably north-central Texas, northwestern Missouri, and northeastern Kansas. It is rather difficult, however, under the circumstances, accurately to apportion the responsibility for damage. Further evidence is being obtained that barberries are of outstanding importance in the production and perpetuation of parasitic strains of stem rust. So far, from 15 aecial isolates, 8 different parasitic strains have been identified, of which several are very virulent. On the other hand, only 10 races have been obtained from 131 uredial isolates. In cooperation with the Division of Cereal Crops and Diseases, of the Bureau of Plant Industry, experiments are being continued on the results of hybridization between varieties and physiologic races of stem rust. Indications are that very unusual combinations can be made, thus demonstrating still further the danger of permitting even a few barberries to persist."

Barberries rusted early in Minnesota in 1938.--Leonard W. Melander, State leader of barberry eradication in Minnesota, reports that remaining barberry bushes rusted early and fairly heavily in Minnesota this year. The first pycnial infections were found on April 26, which is the earliest date since 1921 when first rust on barberry was observed on April 25. This year mature aecia were found on May 6 and the first stem rust on grasses was found on *Agropyron repens* on June 6. The first stem rust on grain near barberries was observed on barley on June 14. Stem rust telia were found on wild grasses near barberry on June 14 in Dakota County. This represents the earliest date telia have ever been reported in Minnesota. At least eight cases of barberry spreading stem rust to grains and grasses have been observed so far this year. Rust observations indicate the likelihood of barberries in the vicinity of Belle Plaine, Scott County, where an area infested with barberry bushes was mapped several years ago. A heavy local epidemic of stem rust developed on rye and wheat in this area this year. An inspection of this locality will be made during the summer.

Barberry bushes located in Grand Forks County, N. Dak., by labor crews.--On June 6, 53 common barberry bushes ranging in height from 3 to 10 feet, and 300 seedlings were found in a small farmstead grove in Plymouth Township in Grand Forks County, according to George C. Mayoue, leader in charge of barberry eradication in North Dakota and Montana. These bushes were located and destroyed early enough to prevent any possibility of rust spreading from them this year. On June 23, 26 barberry bushes infected with stem rust were located in Gilby Township, Grand Forks County. These bushes were in a grove in which many of the trees had been removed. There was evidence that rust had just begun to spread from these bushes to Reward wheat about 25 rods north of the location. While remaining barberry bushes in North Dakota are not numerous and apt to be widely scattered, locations such as those described above represent a distinct hazard to small-grain crops in an area such as Grand Forks County where wheat is extremely importand and grain fields are continuous for many miles.

Favorable conditions for blister rust spread in the Inland Empire.--A late, wet spring and a heavy crop of aeciospores gave blister rust infection of *Ribes* a good start throughout the Inland Empire during May and early June. Abundant uredinial infection has been noted on both stream type and upland *Ribes* in the vicinity of pine infection centers on each operation in the region. Since aeciospore production will continue throughout June and part of July, additional *Ribes* infection may result. However, a period of hot, dry weather during late May and early June gave indications that the amount of this new infection as well as the amount of intensification on the *Ribes* might be slight. With heavy rains occurring throughout the region during the period June 15-18, the situation was completely reversed to the extent that both an extremely widespread initial infection of *Ribes* and heavy uredinial intensification appeared probable. If this build-up of *Ribes* infection is followed by small amounts of precipitation in July and August, the Inland Empire will experience a favorable pine infection year comparable to 1937. Observation during late June at several locations in the regien show that uredinial infection is quite abundant and probably more advanced on *Ribes lacustre* than on the other *Ribes* species. Considerable necrosis of uredinium-bearing leaf tissue is occurring on *R. lacustre* but not on other *Ribes*. If there is a decided increase during the next two weeks in the amount of necrotic area, the telia production of *R. lacustre* will be greatly reduced.

White pine planted in Indiana.--Two Farm Security projects in Indiana have recently planted more than 100,000 white pine in mixture with other pines on some 200 acres of acquired project lands. These plantings are in the southern part of the State in *Ribes*-free areas.

Blister rust notes from Wisconsin.--Blister rust infection on both pine and *Ribes* was found for the first time in Juneau County, Wis., on June 18, 1938. One canker which apparently had fruited several times was found on 1932 wood. In Portage County several *Ribes cynosbati* bushes were noticed which were about 40 percent defoliated due to heavy rust infection. The first telial columns for 1938 were reported at Black Hawk Island in Juneau County on June 18.

COTTON INSECT INVESTIGATIONS

Number of boll weevils surviving in hibernation cages does not indicate number of weevils in cottonfields.--During October and November of each year since 1931, at Tallulah, La., 35,000 boll weevils have been placed in hibernation cages (500 weevils in each of 70 cages). The survival has varied from 6,438 weevils, or 18.39 percent, emerging during May and June 1932 following the extremely mild winter of 1931, to 37 weevils, or .10-percent survival in the spring of 1935. The percentage of surviving weevils is not an index as to the boll weevil population in the cottonfields in the spring because a definite number of weevils are placed in the cages each year, whereas there is great variation in the number of weevils in the fields from year to year at the time the weevils are collected for the cages. Boll weevil counts made by examining the small cotton plants during May and June give a better index as to the boll weevil population early in the season The accompanying table shows that the percentage of weevils surviving does not indicate the number of weevils in the fields. Following the extremely mild winter of 1931-32, when 18.39 percent of the caged weevils survived, there were only 1.35 weevils per 100 plants in the fields during May and June of 1932, whereas the next spring when only .15 percent of the weevils survived there were 1.49 weevils per 100 plants in the fields. This spring (1938) the survival in the cages was less than one-tenth as high as in 1937 (1.13 percent in 1938 and 11.87 percent in 1937), but in the cottonfields during May and June this year the weevils were about twice as numerous as in 1937 (0.53 weevils per 100 plants in 1938 and 0.28 weevils per 100 plants in 1937). The boll weevil survival in hibernation cages of 1.13 percent as reported by G. L. Smith and assistants was much lower than the survival in 1937, 1934, and 1932, but much higher than in 1936, 1935, and 1933; while the boll weevil population in the fields at Tallulah, La., as reported by M. T. Young and assistants, was about twice as great during May and June, 1938, as in 1937, and seven times as great as in 1936 but much lower than in 1935, 1934, 1933, and 1932. The following table shows for the years 1932-38 the survival of boll weevils as indicated by spring emergence at Tallulah, La., from cages in which 35,000 weevils were installed in the fall, and the results of examinations of plants to determine boll weevil population in cottonfields during May and June.

Year	Weevils survived		Plants examined	Weevils found	Weevils per 100 plants
	Number	Percent	Number	Number	Number
1932	6,438	18.39	137,800	1,858	1.35
1933	52	.15	106,000	1,583	1.49
1934	2,630	7.51	109,000	2,671	2.45
1935	37	.10	142,000	1,820	1.28
1936	60	.17	110,800	85	0.076
1937	4,155	11.87	151,000	425	0.28
1938	396	1.13	168,000	903	0.53

Emergence of boll weevils from hibernation.--F. F. Bondy, Florence, S. C., planted 1/5 acre of cotton on March 30 in a field surrounded on three sides by woods and located 1/4 mile from any other cotton. A flight screen trap covered with a sticky material was placed near the center of this small cottonfield. On each day between April 25 and 29 weevils were collected on the screen trap, a total of 27 weevils in 5 days. On April 26, 4 weevils were collected on the cotton. During May, 64 weevils were collected from this 1/5 acre of cotton and 45 on the screen trap. During June, 199 weevils were caught on the cotton and 31 on the screen trap. Of these, 87 from the cotton and 13 from the screen trap were collected from June 15 to 30. Of the 263 weevils taken in the trap crop of cotton during May and June, 75.7 percent were caught in June and 33.1 percent were caught after June 15. As all of these weevils had probably hibernated in the adjacent woods, this test indicates that 33.1 percent emerged and entered the cottonfield after squares were large enough for the weevils to enter, and therefore after the effective season for presquare applications of poison had passed.

Boll weevil control by presquare applications of insecticides.--Rex L. McGarr, State College, Miss., reports on two series of tests of presquare poisoning to control boll weevils on cotton. The purpose of these experiments was to compare the use of small plots (1/2 to 3/5 acre) with larger plots or entire small fields (1 to 3 acres) for tests of this type; and to compare a mixture of 1 pound of calcium arsenate to 1 gallon of water with the materials that are generally used in presquare poisoning, that is, calcium arsenate dust, and a mixture of 1 pound of calcium arsenate dust, 1 gallon of molasses, and 1 gallon of water. All of the tests were replicated and untreated check plots or fields were used for comparison in each case. Twelve large plots or small fields, and 18 small plots were used for the tests. The poison applications were made on June 3 and 4 after counts showed the boll weevil population varied in the different fields and plots from 1.1 to 7 weevils per 100 plants. Approximately 5 pounds of the calcium arsenate dust and 2 gallons each of the calcium arsenate-molasses-water and calcium arsenate-water mixtures were applied per acre. Mr. McGarr states: "An analysis of the presquare boll weevil work this season strongly indicates: That the control from one application of the calcium arsenate dust and calcium arsenate-molasses-water mixture gave a satisfactory kill of weevils in both the large and small plots; that there was very little difference, if any, between the effectiveness of these two treatments in either the large or small plots; that the infestation in the small plots was delayed about 2 weeks in reaching approximately that of the untreated plots and 3 weeks in the big plots; and that the calcium arsenate-water mixture did not give satisfactory control."

Pink bollworm investigations.--A. J. Chapman and associates at the Presidio, Tex., station, report that bloom infestation counts were made at 3-day intervals during June in 12 fields. The counts in these fields showed a slightly higher infestation than the same fields last year. There was a wide spread in the infestation in the individual fields depending upon the cultural treatment during the past winter. The fields that were heavily pastured showed a much lower infestation than fields that were not pastured. The emergence of native parasites in hibernation cages showed a larger parasite population for 1937 than for previous years. This was probably due to the omission of field clean-up in 1936. Microbracon mellitor Say (Hawaiian strain) was the only imported species recovered from the hibernation material. Collections of pink bollworms in cotton blooms were made the latter part of June in an attempt to recover the introduced species released last year. Thus far only native species have emerged from these collections. Tests were conducted under a large field cage to determine the effects of different winter plowing and irrigation treatments on pink bollworm survival. The cage is divided into three sections which permits three cultural tests to be conducted simultaneously. The pink bollworm survival or carry-over in the different treatments was determined by making daily bloom infestation counts during June. This season's results were the same as the results from similar treatments last year. Early winter plowing without a winter irrigation showed the lowest survival, early winter plowing followed by a winter irrigation showed the next lowest survival, and late winter plowing showed the highest survival. These results were contrary to the results from similar treatments in the hibernation experiment. The conflict in the records in the two experiments was attributed to the higher moisture content of the soil under the field cage. Due to the lower evaporation under the cage the early buried material was exposed to a soil with a higher moisture content than the material with similar treatment in the hibernation experiment. The fact that there was a lower survival under the cage in the early winter buried treatment than in the early winter buried and irrigated treatment suggests that survival might be influenced by soil moisture conditions. The disintegration of the infested bolls would be dependent upon the microfloral activity in the soil which would in turn be influenced by the soil moisture. There was an earlier moth emergence from the hibernation experiment this year than the past 2 years. The peak of the emergence this year came during the last half of April while in the 2 preceding years it came during the first half of May. The survival from the various cultural treatments followed the same trend as the 2 preceding years. In every instance winter burial followed by a winter irrigation decreased the survival over winter burial without a winter irrigation. The earlier in the winter that the infested material was buried and watered the lower the survival, and the earlier in the winter the material was buried and not watered the higher the survival. Depth of burial also greatly influenced the survival, since 62 percent of the emergence came from the 2-inch depth, 29 percent from the 4-inch depth, and 9 percent from the 6-inch depth. The time of application of a spring irrigation influenced the time of emergence as well as the rate of emergence. An early spring irrigation stimulated an early emergence, whereas a late spring irrigation delayed the emergence. The rate of emergence was much faster from the late spring watering than from the early spring watering. It required only 5 weeks after the water was applied for 95 percent of the moths to emerge from the April 20 irrigation, while it required 10 weeks for a similar percentage to emerge from the March 10 irrigation. The difference in the rate of emergence was due to temperature. In April the temperature was favorable for worm activity while in March the temperature was unfavorable. Twelve varieties are being tested this year for their resistance to pink bollworm attack. The varieties were planted on April 5, and the first bloom was noted on Delfos 531B June 5, or 61 days after planting. All of the varieties had bloomed by June 9. Bloom infestation counts during June showed that D & P L 812-21 had a lower infestation than Delfos 719 and 389x10-22 which were located on adjoining rows. While this would indicate that D & P L 812-21 had shown some resistance, it was thought that it was probably due to the fact that the moths preferred the adjoining varieties since they produced a larger number of blooms. The bloom records indicate a heavier infestation in the variety field this year than last year. An experiment was installed to determine the effects of withholding the first irrigation following planting on the development and maturity of the crop. Three irrigation dates were used in the test, 30, 45, and 60 days after planting. From the appearance of the cotton during June, 45 days following planting seemed to be the optimum time for applying water under the conditions of this experiment.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Harvesting of the new cotton crop.--A total of 1,872 bales of cotton had been ginned in the lower Rio Grande Valley district at the close of June. The drought which this area experienced in the late spring and early summer resulted in the premature opening of a considerable amount of cotton. Cotton pickers are plentiful, and the price for picking ranges from 40 cents to 65 cents per hundred pounds. This is, of course, the only area in all the United States in which cotton was harvested during June, with the exception of a few bales in the Corpus Christi section of Texas.

Vehicular inspection.--The vehicular-inspection station was opened on the principal highway leading out of the lower Rio Grande Valley on June 22. This station is operated on a 24-hour basis, and serves to prevent the movement of cotton products out of the area which might be moving in violation of the pink bollworm quarantine. A number of small lots of green bolls, open bolls, and even entire cotton plants with bolls, were intercepted at this station in the few days it operated in June. A road patrol is operated for the purpose of covering secondary roads leading out of the area, which are not in good enough condition to be used by commercial truckers. Occasionally cotton pickers and others do travel these secondary roads, making it necessary to maintain a close supervision over the traffic on such roads. Road patrols are still being operated on all of the highways leading out of the Panhandle district of Texas and New Mexico. Very few violations of the quarantine have been noted by the road patrol operating in that area.

Laboratory inspection.--A considerable quantity of sea-island cotton bolls was collected during the fall of 1937 and placed in preservative for later examination in the laboratory. About 90 percent of these bolls were brought to San Antonio for examination, which has now been completed with negative results. The other 10 percent are in process of being examined in the laboratory at Miami, Fla. Those bolls examined at San Antonio showed a wide range in boll weevil infestation, as bolls collected in some sections of Georgia and northern Florida were lightly infested by the boll weevil, while bolls from other sections showed relatively heavy boll weevil infestation.

Wild-cotton eradication.--Field work in connection with the wild-cotton eradication program came to a close during June. It will be resumed in late October. Excellent progress has been made toward final eradication of wild-cotton plants in Florida and the pink bollworm infestation has been reduced to a very low percentage. The examination of 29,500 wild-cotton bolls collected south of Naples along the west coast, in the Ten Thousand Islands section, in the Cape Sable area, and on the Florida Keys, resulted in only 10 specimens of the pink bollworm being submitted for identification. Inspection of bolls during the active season along the west coast of Florida north of Naples was negative. This considerable reduction of pink bollworm infestation in wild cotton south of Naples and the negative findings north of Naples is of considerable importance due to the fact that sea-island cotton is now being grown in Florida as far south as Manatee County, in which the pink bollworm formerly existed in wild cotton.

Thurberia plant eradication.--Despite extremely hot weather and the rough country in which the crews had to operate, the morale of the W. P. A. workers engaged in this activity remained at a high level. An average of 68 laborers were employed in this activity throughout the month of June, covering 2,240 acres and locating and destroying 5,956 Thurberia plants.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Flowering of hot-water-treated imported bulbs.--As a result of extensive surveys during the spring of 1938 in the States of North Carolina, Virginia, Maryland, Pennsylvania, New York, and Washington, by the staffs of the Beltsville, Md., Babylon, N. Y., and Sumner, Wash., laboratories, in fields where imported narcissus and other flowering bulbs were planted that had been given the prescribed hot-water treatment during the fall of 1937, it was found that in general the flowering performance of these hot-water-treated imported stocks was satisfactory enough to permit the sale of the flowers in the majority of instances. A reduction in the potential flower crop was evident in some fields. This was manifested either in the form of "blind" buds, or the stems and buds were killed outright. This condition was more marked in some varieties than in others. The imported bulbs seemed to flower better than did similarly treated domestic bulbs. The indications are that the Poetaz types suffered more from the treatment than did the trumpet types. In the former the number of florets per stem was reduced and in some instances the size of the individual floret was below normal. In the trumpet types the injury was more visible than in the Poetaz types and ranged from complete "blindness" to nearly perfect flowers. In general it was found that the least injury was evident in the bulbs which had received an early treatment. The growth of the planted bulbs was satisfactory in the majority of instances and the indications are that a satisfactory increment will result. The foliage showed various types of injury ranging from spotting to severe roughening of the leaf surface. It is not known at this time what effect, if any, the injury to the foliage will have on vegetative increase. It appears that successful flowering performance of the imported hot-water-treated bulbs during 1938 was due principally to the excellent well-cured and dormant condition of the imported bulbs when they arrived in this country and at the time of treatment. It is assumed that if the foreign growers and shippers can deliver similar well-cured and dormant stocks each year, equally good flowering and growth will result, provided weather conditions are favorable.

Species of insects found on sugar beets grown for seed in the Southwest.—O. A. Hills and his associates at the Phoenix, Ariz., laboratory, report that surveys made during April, May, and June, 1938, in fields of sugar beets grown for seed in the Salt River Valley of Arizona, as well as in certain areas of New Mexico and California, have disclosed that, in addition to the beet leafhopper (*Eutettix tenellus* (Bak.)), the following potentially economic species of insects were present in the fields: (1) Two closely related species of the tarnished plant bug (*Lygus pratensis oblinatus* Say and *L. hesperus* Knight); (2) the false chinch bug (*Nyzus ericae* (Schilling)); (3) the small plant bugs (*Thyanta brevis* Van Duzee and *T. custator* (Fabr.)); and (4) Say's plant bug (*Chlorochroa sayi* Stahl). With the exception of *T. brevis*, it seems doubtful, judging from observations made thus far, that any of these latter-named species occurred in sufficient abundance to cause appreciable economic damage. In the Mesa-Chandler area of the Salt River Valley of Arizona, *T. brevis* apparently migrated into the fields of seed beets during the month of May and may have been numerous enough to cause some damage to seed germination, although no injury was superficially apparent. Further studies are being made to determine the economic status of the species of insects found on seed beets.

Hibernation studies of the tobacco flea beetle in South Carolina.--As a result of studies on the hibernation of the tobacco flea beetle (*Epitrix parvula* (F.)) in South Carolina, Norman Allen, of the Florence, S. C., laboratory, reports that in a series of hibernation cages started during the fall of 1937, which were designed to test the status of plain loose soil, leaves and debris, broomsedge, Spanish moss, and tobacco stalks and leaves as hibernation media for the flea beetle, it was disclosed that there was a range of survival in these media which extended from 3.5 to 29.0 percent, with an average for all of the media of 10.46 percent. The highest survival of the flea beetles obtained was in plain loose soil and the lowest survival was recorded in the tobacco stalks and leaves. Statistically, however, there was no significant difference between the survival attained with the different hibernation media enumerated. Examination of the cages during the spring season showed that the emergence of the flea beetle from hibernation began at least as early as February 10; that it continued through April 23; that the peak of emergence occurred during the period from March 16 to 27; and that the majority of the flea beetles had emerged by the time field transplanting of tobacco was well under way, coinciding with results obtained in similar hibernation studies conducted in 1937.

Tolerance of tomato plants to certain insecticides.--Laboratory tests performed by Joseph Wilcox, of the Alhambra, Calif., laboratory, in connection with investigations on the control of the tomato fruit worm (*Heliothis obsoleta* (F.)), showed that hydrated lime was safer to use as a diluent for paris green than talc on tomato foliage. It was shown also that mixtures of cryolite and calcium arsenate with talc (50-30-20) might cause some degree of burning to the tomato plant, but additional tests are necessary in order to determine this point definitely. This combination, if it could be used safely in the field, would have a distinct field of usefulness as a three-fold insecticide for the control of the tomato fruit worm, the tomato pinworm (*Gnorimoschema lycopersicella* (Busck)), and the hornworms (*Protoparce* spp.). These tests showed further that a poison bait mixture consisting of 25 pounds of corn meal and 1 pound of calcium salt of dinitro-cyclohexyl phenol was apparently not safe to use on tomato foliage, whereas a poison bait mixture consisting of 25 pounds of corn meal and 1 pound of paris green caused burning to the foliage but was rendered safe for the purpose by the addition of 1 pound of hydrated lime to the formula.

Effective dilutions of cryolite and cuprous cyanide against the tomato pinworm determined.—J. C. Elmore, of the Alhambra, Calif., laboratory, reports that laboratory tests on potted tomato plants against the tomato pinworm demonstrated that the toxicity of a commonly used brand of natural cryolite to this insect increased as the dilutions were increased from 10 percent to 60 percent. At a 10-percent dilution 69 percent of the pinworm larvae were killed, whereas at the 40-percent dilution 97 percent of the pinworm larvae perished. There was a distinct leveling-off of the mortality curve at the 40-percent dilution. The toxicity of cuprous cyanide to the tomato pinworm larvae also increased at progressive dilutions of 5, 10, 15, 20, and 30 percent. At strengths below 30 percent, the tomato pinworm mortality was less than 90 percent of the individuals tested. Copper cyanamid and sulphur nitride (0.5 percent) were relatively ineffective against *G. lycopersicella* larvae in these tests.

Duration of the toxicity of cube dust mixtures to the tobacco flea beetle on shade-grown tobacco.—F. S. Chamberlin, of the Quincy, Fla., laboratory, reports that results of recent experiments designed to determine the duration of the toxicity of a cube dust mixture containing 1 percent of rotenone to the tobacco flea beetle (*Epitrix parvula* (F.)) on shade-grown tobacco have shown that the toxicity of this dust mixture to the insect decreases very rapidly under shade-grown tobacco conditions. In the presence of the most favorable weather conditions the effectiveness of a light application of the cube dust mixture is limited to approximately 3 days but apparently the toxic action occurring on the third day after application is relatively slight. Showers evidently remove much of the cube dust mixture from tobacco foliage and render such applications ineffective. It is believed that this mechanical loss by the action of rain is one of the most important factors limiting the effectiveness of cube dust mixture for flea beetle control in the Florida region. Applications of cube dust mixtures made to shade-grown tobacco by the "drift" method when the foliage is moist with dew appeared to be more effective against the flea beetle than when the treatments are applied to dry foliage. The above results were obtained and conclusions drawn from experiments wherein the method of procedure consisted of confining a definite number of tobacco flea beetles with leaf discs cut from the treated foliage at various intervals and determining the percentage of the resulting flea beetle mortality.

Chloropicrin not effective as a fumigant for the cigarette beetle in stored tobacco.—W. D. Reed, of the Richmond, Va., laboratory, reports that the results of an experiment completed during the period June 10 to 27, with chloropicrin for the atmospheric fumigation of 238 bales of cigar filler tobacco at a dosage of 4.4 pounds of the liquid per 1,000 cubic feet of space, with an exposure of 72 hours, disclosed that this fumigant not only was ineffective in attaining satisfactory mortality of well-grown larvae of the cigarette beetle (*Lasioderma serricorne* (F.)) in the tobacco bales but that it required a period of 14 days after the fumigation was completed to aerate the tobacco sufficiently for removal, during which time the ventilating system in the fumigating chamber was operated for a total of 71 hours. The temperature of the tobacco at the start of the fumigation period was 75° F., and during the time required for aeration of the tobacco, the temperature ranged from 66° to 81°. In test lots of cigarette beetle larvae placed in the air space between the stacked bales of tobacco, a mortality of 100 percent was obtained. In the lots placed in test spikes at depths ranging from 1¼ to 9¼ inches in the tobacco bales, a satisfactory mortality was not obtained, since it ranged from 24.4 to 34.3 percent in the test insects as compared to 24.8 percent in the check lots of larvae kept under similar conditions throughout the duration of the test.

INSECTS AFFECTING MAN AND ANIMALS

Fumigation of clothing for killing ticks.--As a result of numerous inquiries concerning methods of de-ticking clothing worn by hikers or others having occasion to traverse tick-infested territory, a series of tests was made in the Washington laboratory. Using a 30-pound lard can as a fumigating chamber it was found that 100-percent mortality in unengorged *Dermacentor variabilis* (Say) placed among clothing in the chamber occurred when one teaspoonful of either carbon disulphide or carbon tetrachloride was exposed in the chamber for 8 hours with the lid of chamber sealed with adhesive tape. J. M. Brennan, J. L. Webb, and H. L. Trembley collaborated in making the tests.

Effect of Bonneville Dam on mosquito prevalence.--H. H. Stage, of the Portland, Oreg., station, reports an interesting observation made at the mouth of Wind River, Wash.: "Previous to this season *Aedes vexans* Meig. and *A. aldrichi* Dyar and Knab have been abundant in the vicinity of the State Fish Hatchery. Large willow flats were situated not far away but no longer exist because they are now flooded by the permanent lake formed by closing the gates at Bonneville Dam. As was expected, this area has ceased to function as a mosquito breeder and definite information has been obtained regarding the few numbers of mosquitoes from Bonneville Dam to The Dalles, certain sections of which had heretofore been seriously annoyed by the pests."

Cashew nutshell oil vs. mosquitoes.--Mr. Stage further reports: "Several tests, both in the laboratory and in the field, show this oil to be highly toxic and certainly a promising new material. Sprays were made up of this material with 95 percent kerosene and also with 95 percent Diesel oil and under severe field conditions. From 85-percent to 95-percent kills were obtained when applied at the rate of 12.5 gallons per acre of water surface."

Mosquito control on T. V. A. reservoirs.--As a member of the Board of Malaria Consultants, T. V. A., W. V. King attended a conference on malaria control operations in the Tennessee River impounded areas, at Sheffield and Decatur, Ala., during the week of June 27. Three days were spent inspecting *Anopheles* breeding conditions and control problems on Pickwick, Wheeler, and Wilson reservoirs. On the Pickwick and Wilson reservoirs he reports that effective control is maintained at a minimum expense by controlled fluctuations in the water level, thus avoiding *Anopheles* breeding in vegetation along the shore line. In the large Wheeler Lake, which was impounded early in 1937, effective control has been maintained in the upper and lower portions, but in the central portion where extensive flats are covered with shallow water, the control problem has proved to be extremely difficult.

Screwworm infestation in wild animals.--A. W. Lindquist, of the Uvalde, Tex., station, reports that during the first half of June a rather complete survey was made in Edwards, Kimble, Kerr, Gillespie, Mason, Bandera, and Real Counties to determine as nearly as possible the part played by wild animal life in building up *Cochliomyia americana* Cushing and Patton population. This work was carried out by contacting ranchmen, game wardens, and other interested people, and by making observations and counts of infested wild animals, especially deer, in areas. It was determined that approximately 20 percent of the adult deer become infested during the average season, and that 20 to 60 percent of the fawns become infested. By actual count while in the area, it was indicated that approximately 3 to 4 percent of the deer were infested. It was indicated that there is a high death loss in deer, and also in rabbits. The most valuable information obtained was the reports of people owning rabbit dogs that rabbits with screwworm infestations usually would hide in burrows or hole up in other places and would not be found unless they were hunted with dogs. These people reported that a high percentage of both cottontails and jack rabbits were infested with screwworms during most years.

Sand fly repellent.--J. B. Hull, of the Savannah, Ga., laboratory, reports that tests were continued the last quarter on the pyrethrum and oil mixtures for protection of man while outdoors. This mixture was first used when farmers on Wilmington Island, near Savannah, complained of sand flies annoying their farm animals to such an extent that it was impossible to work the animals in the early morning and late afternoons. Samples of the mixture, that is, 1 part pyrethrum extract #20 to 20 parts of lubricating oil (about 5 S.A.E.) were supplied to these farmers with instructions to spray the animal lightly, covering the outer hair only, so as to avoid any chance of burning or overheating the animal. All reports from farmers using this formula have been very encouraging. By spraying the animal in the early morning, at noon, and at night the farm animals have shown little annoyance from sand flies. These tests led to the use of the same mixture for personal control. They reported that by applying such a mixture they were not annoyed by sand fly bites for at least 4 hours. The following report was received from a group of men working in an extremely bad sand fly section: "The mixture was applied when sand flies were biting very bad; after an application of the oil no bites were experienced; but the men had almost become black from the sand flies that had been killed while attempting to bite." The above report is approximately the same as received from all using the mixture.

Protection of outdoor gathering from mosquitoes.--A successful test of the efficiency of the New Jersey larvicide in protecting outdoor gatherings from mosquitoes was made by J. L. Webb, of the Washington office, on the evening of June 23 at Landover, Md. Approximately 100 people--men, women, and children--grouped at a garden party were kept free from mosquito annoyance up to 11 p.m. by using the larvicide according to Dr. Ginsburg's published directions. An area approximately 25 yards square was protected by the use of 33 gallons of larvicide spray.

Motion picture of housefly biology.--Ray Fernstrom, cameraman for Scientific Films, Inc., Hollywood, Calif., a branch of Paramount Pictures, Inc., spent June 12 at the Dallas laboratory of the Bureau, making a colored film of the biology of the housefly and of this laboratory's method of testing fly sprays.

FOREIGN PLANT QUARANTINES

Trunkful of contraband.--A large trunk from the Madeira Islands was inspected at New York on July 2, 1937. In the trunk were the following: Twelve loquats, 44 passion fruits, 4 pounds of grapes, 14 pricklypears, 9 plums, 1 orange, 1 stem of bananas, 3 pounds of green banana leaves, 1 Tillandsia plant, 31 nodes of sugarcane, 20 pounds of sweetpotatoes, 19 fern plants, and 3 lily bulbs. Among the insects taken were 14 living larvae of the Mediterranean fruitfly in 5 loquats.

Entomological interceptions of interest.--Two larvae of the Mediterranean fruitfly (Ceratitis capitata Wd.) were intercepted at Boston on March 16 in an apple in ship's stores from Australia. Larvae of the papaya fruitfly (Toxotrypana curvicauda Gerst.) were intercepted at Miami, Fla., on April 1 in a papaya fruit in baggage from Cuba. An adult of the weevil Naupactus xanthographus Germ. was taken at New Orleans on March 10 on a grape in cargo from Argentina. The scale insect Leucaspis podocarpi Green was intercepted at Honolulu, Hawaii, on September 21, 1937, on Podocarpus nivalis in cargo from New Zealand. A living specimen of the cicadellid Nesosteles neglectus (DeL. & D.) arrived at Brownsville, Tex., on February 4 on a gardenia in cargo from Mexico. Two living adults of the weevil Diaprepes abbreviatus spengleri L. were collected on April 3 on a grapefruit tree in the field at Rio Piedras, P. R. Two living specimens of the mirid Eurycipitia vestitus Dist. were intercepted at San Francisco on April 23 on an orchid (Oncidium cavendishianum) in cargo from Guatemala. The scale insect Parlatoria viridis Fuller was found at Philadelphia on March 2 on palm foliage in ship's furnishings from Australia. Fourteen living adults of the bruchid Acanthoscelides armitagei (Pic.) were taken at Washington, D. C., on May 2 in pigeonpeas (Cajanus indicus) in the mail from the Canal Zone. A larva of the Asiatic rice borer (Chilo simplex Butler) arrived at Detroit, Mich., on March 8 in rice straw packing in cargo from France. Fifteen weevil larvae (Apion sp. probably A. carduorum Kirby) were intercepted at New York on April 7 in midribs of leaves of cardoon (Cynara cardunculus) in ship's stores from Italy.

Pathological interceptions of interest.--Aphelenchoides limberi Steiner was intercepted in dahlias from Germany on February 15 at Washington. (See note in the News Letter for December 1936, p. 26.) Bacterium vesicatorium Doidge was intercepted on peppers from Brazil at Jacksonville on May 18. Botrytis allii M. T. Munn was intercepted in onions from Spain June 4 at New York. Cephalosporium sacchari Butl. was intercepted for the first time since 1922, on sugarcane in baggage from Mexico in May at Brownsville. Ditylenchus dipsaci (Kuhn) Filipjev was intercepted from Uruguay for the first time June 23 at New York, the host being garlic. Fusicladium depressum (B. & Br.) Sacc. was found on fennel stems from Italy at New York July 1. Gloeosporium leguminum Cke. was again intercepted on mesquite beans in baggage from Mexico, June 15, at Brownsville. *Lophodermium juniperinum* (Fr.) DeNot was intercepted for the first time May 27 at Boston on juniper in mail from Sweden. *Phragmotrichum chailletii* Kze. was intercepted at New York May 6 on *Picea excelsa* cones in baggage from Germany. *Phyllachora trifolii* (Pers.) Fckl. was found on clover leaves in baggage from Italy June 17 at New York. *Phyllosticta auerswaldii* Allesch, first interception, was found in baggage from Germany June 2 at New York on leaves of *Buxus sempervirens*. *Puccinia arenariae* (Schum.) Wint. was found on *Stellaria media* in baggage from Italy May 25 at New York. *Puccinia buxi* D. C. was intercepted on box leaves in mail from France May 24 at Chicago. *Septoria stellariae* Rob. & Desm. was intercepted for the first time May 25 on *Stellaria media* in baggage from Italy at New York. *Tylenchus filiformis* Butschli was intercepted for the second time June 3, at New York, on *Araucaria excelsa* roots in baggage from Germany.

DOMESTIC PLANT QUARANTINES

Grasshopper bait supplied exceeds egg-survey estimates.--As of July 12, the total bait material equivalent available to the grasshopper-infested States had reached 137,222 tons, exceeding the survey estimate by almost 9,000 tons. Heaviest excess demands for bait came from Colorado, New Mexico, North Dakota, and Wisconsin. The former two States exceeded expectations on account of aggressive campaigns against *D. longipennis*.

Grasshopper infestation heavy in North Dakota.--Early July reports from Iowa indicated less probable grasshopper infestation than was predicted from egg-survey reports. As a result, that State relinquished one-half of its quota of about 20,000 tons of bait materials. Five thousand tons of this bait was reallocated to North Dakota, where the actual infestation exceeded survey predictions. By July 12, only approximately one-half of this 5,000 tons of bait had been requested by the State leader, despite reports of severe hopper damage in some sections.

Aggressive grasshopper control program in longipennis area.--In the *longipennis* area of Colorado, the participation of farm operators in the control campaign is reported to be between 70 and 90 percent. W. P. A. crews have been used on spreaders, apparently very efficiently. A most encouraging report from New Mexico indicates that 85 to 95 percent of hoppers (*D. longipennis*) which hatched in that area have been controlled as of July 8.

Harvest delays grasshopper baiting.--Wheat harvest has temporarily withdrawn the attention of farmers from baiting operations in Kansas, Nebraska, Oklahoma, and West Texas. It is anticipated that further demands for bait will be forthcoming from these farm operators after harvest for protection of corn, hay, and forage crops.

Mormon crickets damage range grass, trees, and shrubs.--The most conspicuous damage observed in Idaho was the severe defoliation of Lupine, Alfilaria, and Arrowleaf Balsamroot. The destruction of seeds of many species of range grasses is evident in all areas in Idaho and Nevada, where crickets occur in numbers, and in some areas the plants are cropped close to the ground by crickets. Injury to trees and shrubs is also evident.

Mormon cricket program indicates local eradication possible.--Tremendous kills have been secured in some areas of Wyoming and Montana by various control operations. Unusual weather conditions have kept crickets bunched and available materials, equipment, and labor at the critical time has enabled control crews to do unusually effective work in the concentrated infested areas.

Mormon crickets begin egglaying.--In Oregon, Utah, and Washington, egglaying began in late June in the more advanced areas while at the same time, at higher elevations, crickets were in the fifth instar. In Wyoming numerous hymenopterous egg parasites were present where heavy egg deposits occurred.

Predators assist Mormon cricket control.--Aside from sodium arsenite dust, oiled ditches and streams, and metal barriers, the Mormon crickets are having their own troubles with parasites, predators, and cannibalism. Crows, curlews, blackbirds, hawks, sea gulls, meadowlarks, ground squirrels, and prairie dogs have been observed to feed on these pests. Smaller birds have been observed in attacks on Mormon crickets, but the larger birds appear to have much better success. In areas where grasshopper control overlaps the cricket control program, dead Mormon crickets have been found where grasshopper poison had been spread.

Calcium arsenate effective against the white-fringed beetle.--Calcium arsenate dust has been used rather extensively in the program which is being conducted in infested areas in Alabama, Florida, Louisiana, and Mississippi to control the white-fringed beetle. Results obtained to date show that almost complete kills on rather extensive areas have been made. Weather conditions have been unusually favorable for the use of poison dust since there has been very little rainfall in affected areas.

Results of white-fringed beetle survey.--As a result of an extensive survey which is being conducted in known infested and nearby States, infestations have been discovered at a point approximately 20 miles east of New Orleans, at DeLisle, Miss., and at Moss Point, Miss., where about 640 acres are involved, at Gulfport, Miss., where a closely related species of Naupactus had previously been reported, at Mobile, Ala., near the Mobile & Ohio yards, and in a location in Alabama approximately 60 miles distant from the Florala infested area. States to which shipments of nursery stock had been consigned from infested nurseries in Louisiana and Mississippi are cooperating in the survey by inspecting such shipments and the environs where planted. No infestations have been reported to date.

Peach mosaic nursery and budwood environs inspection.--In conformity with State quarantine requirements relative to nursery and budwood environs inspection, this environs inspection work has been completed. Mosaic-infected trees were found within the 1-mile radius of several nurseries or budding wood sources.

Peach mosaic symptomless carrier trees removed.--In Arizona, W. P. A. workers are working on the removal of a plum orchard of 3,000 trees in Maricopa County. Research work conducted in infected areas indicates that certain varieties of plums are symptomless carriers of peach mosaic. In

Colorado, in the heavily infected area of Mesa County, all plum trees were grafted with healthy peach scions, which stand as permanent indicators of the health of the plum trees.

Peach mosaic infested area extended.--Peach mosaic has been found in the peach-growing area of Delta County, Colo. This finding was incidental to nursery and budwood environs inspection and involves another concentrated and rather extensive peach-growing county. In the July 1, 1938, issue of the Bureau's News Letter, peach mosaic was reported from Woods County, Okla. This report has been found to be erroneous.

Nurserymen move plantings from phony peach areas.--Nursery environs inspection for phony peach disease has been completed in Alabama, Arkansas, Georgia, Mississippi, and Tennessee. Growers and nurserymen are taking a keen interest in the work. A good many nurserymen are locating their nurseries away from peach-growing areas and cities and towns, which will assist materially in nursery environs inspections in future.

Transit inspection.--With the passing of the nursery stock shipping season, transit inspection activities are being largely directed to inspection of fruits and vegetables to determine compliance with the Japanese beetle quarantine.

Motion pictures of pest control.--The Office of Motion Pictures of the Department is making films of control operations being carried on against grasshoppers, Mormon crickets, and the white-fringed beetle. These pictures will also feature the life history and habits of these pests throughout the season. Films will be available for educational purposes when completed.

CONTROL INVESTIGATIONS

Humidity has important effect on efficiency of nicotine fumigation.--In studies on nicotine fumigation in greenhouses, H. H. Richardson and J. W. Bulger, of the Beltsville, Md., laboratory, have found relative humidity to be very important in its effect on efficiency, corroborating earlier work on a laboratory basis. Manufacturers' recommendations to the contrary, mortality was definitely higher under dry than under moist conditions. Analyses of the nicotine concentrations by Mrs. R. L. Busbey, of the Division of Insecticide Investigations, indicated higher nicotine concentrations available under the dry conditions. The indications were that most all the toxic action of a nicotine fumigation takes place in the first hour, the results being practically equal to those obtained in an overnight exposure.

INSECTICIDE INVESTIGATIONS

Statistics on the consumption of insecticides and fungicides in the United States for 1936.—Statistics on the consumption of insecticides and fungicides in the United States for 1936 have been published by R. C. Roark (Chemical Industries, vol. 42, no. 6, part 1, pp. 636, 637, 639, June, 1938). In that year 44,000,000 pounds of lead arsenate, 45,000,000 pounds of calcium arsenate, and 3,000,000 pounds of paris green were consumed. Imports of pyrethrum flowers during the first 11 months of 1937 broke all previous records, amounting to about 18,000,000 pounds. In 1936, 510,337 pounds of derris and 1,829,056 pounds of cube were imported. The consumption of practically all insecticides and fungicides has increased greatly during the last 20 years.

Evaluating derris and cube.--H. A. Jones, of the Division of Insecticide Investigations, and W. N. Sullivan, of the Division of Control Investigations, have published a paper on evaluating derris and cube (Jour. Econ. Ent., vol. 31, no. 3, pp. 400-405, June 1938). They found chloroform to be the best solvent for the toxic constituents of these roots.

Particle size of insecticidal sulfurs.--L. D. Goodhue (Jour. Econ. Ent., vol. 31, no. 3, pp. 410-414, June 1938) has reported on the particle size of commercial insecticidal sulfurs as determined by sedimentation analysis. Forty-four samples were analyzed. The flotation pastes and suspensions of colloidal sulfur were found to contain the most fine material. The percentage of material passing a 325-mesh sieve was found to give very little indication of the amount of very fine sulfur in a sample.

BEE CULTURE

Alum lead arsenate apparently more dangerous to honeybees than plain lead arsenate spray mixture.--George H. Vansell, of the Pacific States Bee Culture Field Laboratory, reports that an interesting statement concerning a change in the effect on bees from spray practice was made by Thomas Davis, at Courtland, who lives in the area where he produces package bees and queens for market. The statement was to the effect that the growers of pears (and apples) are using an alum lead arsenate spray mixture. This practice was begun in 1930 in view of the better control of the large codling moth larvae. The action of the alum is supposed to be one of stringency within the alimentary tract, causing the worms to retain the poison which normally is passed out as a result of the irritation from the arsenic. The main point of the note here is that from the beginning of the time of the spray the poisoning of honeybees has been severe, while previous to this time very little injury was in evidence. The situation has become so serious that the apiaries of the Davis Bros. will probably soon be removed from the area.

Use of fenugreek as a cover crop in orchards potentially dangerous to honeybees.--Mr. Vansell also reports that the use of fenugreek has also increased sharply during the past several years. This crop is grown immediately under the trees and with the blossoms standing upright, making an ideal set-up for receiving the spray material dropping from the trees. This plant is very attractive to honeybees, as a source of nectar, as shown by refractometer records available from Davis, Calif., in March 1936. The average concentration was 32.9 percent sugar. No pollen activity has been noted on fenugreek.

UNIVERSITY OF FLORIDA
3 1262 09243 4835

INSECT IDENTIFICATION

New coleopterous larval material received.--Because of the wide gaps in the series of known coleopterous larvae, it is always of particular interest to secure larval material which, through careful rearing, has been definitely associated with adult specimens and can be positively identified. Through J. F. Cooper, of the Division of Fruit Insect Investigations, it has been possible to obtain larvae known to be *Phyllophaga gracilis angulata* Glasgow and *Anomala minuta* Burm., neither of which was previously represented in the Museum larval collection. Larvae of *Conotrachelus floridanus* Fall, definitely determinable as the result of rearing work conducted by an inspector of the Mexican Department of Agriculture in cooperation with the Brownsville office of the Division of Foreign Plant Quarantines, have also been received. Larvae and adults of this species had not previously been associated.

Occurrence of an injurious European lepidopteron in Canada.--Specimens recently received from J. McDunnough, of the Canadian Entomological Branch, have been identified by August Busck as *Lamprionia rubidella* Bjerkander. The insect was reported as doing serious injury to raspberry near Fredrickton, New Brunswick. Apparently this is the first record of the occurrence of this well-known raspberry pest in America.

Ants injurious to orange foliage.--Ants determined by M. R. Smith as *Trachymyrmex septentrionalis obscurior* var. *seminole* Whlr., *Monomorium minimum* (Buckley), and *Iridomyrmex pruinosus* (Roger) were submitted by Herbert Spencer, of the Division of Fruit Insect Investigations, with the report they had been found feeding on the young leaves of oranges in a grove at Plymouth, Fla. In the case of the first-named species 8 or 10 trees in a 5-acre grove were said to have been defoliated.

A tobacco-infesting hemipteron from Guam.--A mirid, determined by H. G. Barber as *Engytatus tenuis* (Reuter), was recently taken on tobacco on the island of Guam by R. G. Oakley. This widely distributed tobacco pest was not previously known to occur there. The species was described in 1895 from the Madeira Islands as *Cyrtopeltis tenuis*. Since that time it has been found injuring tobacco in the southern United States, in the West Indies, particularly Cuba and Puerto Rico, and in Central America. W. E. China, of the British Museum, in discussing the synonymy of this species in the Ann. Mag. Nat. Hist. 11th Ser., Vol. I, 1938, pp. 604-607, has shown that under various other names it is widely distributed in the Oriental region, India, Java, etc.

Recent additions to the Diptera collection.--S. Adler, of the Hebrew University, Jerusalem, presented to the Museum, in exchange for some specimens taken on his visit here, 25 specimens of 12 species of *Phlebotomus*, all mounted on slides, most of them Palaearctic and most of them new to the collection. This is a valuable addition since they have been determined by Dr. Adler, one of the authorities on the genus. The Museum has also received from F. C. Camargo of Brazil 123 specimens of the genus *Anastrepha*, consisting of 16 species, 15 of which were determined by A. Costa Lima and 1 of which was new to our collection. This collection is of particular interest and value, since a number of the specimens are from the same rearings as the types of the species.

---oOo---